Case study title: **Historic Assessment of the Socio-economic Vulnerability of United States Coastal Counties**

Contact(s):

Name: Susan L. Cutter, Director Hazard Research Lab/University of South Carolina Distinguished Professor
Organization: Hazards Research Lab, University of South Carolina
Department of Geography
University of South Carolina
Columbia, SC 29208
Phone: (803) 777-1699
Fax: (803) 777-4972
E-mail: scutter@sc.edu
URL: http://www.cla.sc.edu/geog/hrl

Case study emphasis: Socio-economic vulnerability

Summary:

Throughout the last several decades, coastal populations of the United States have steadily increased. As coastal populations rise so to do the risks of loss due to natural hazards. Until recently most research on coastal vulnerability has focused on the physical aspects of vulnerability (i.e., hurricane landfall probabilities, beach erosion, and sea-level rise). This paper however, focuses on the social and economic vulnerability of coastal counties in the United States.

Using county level United States Census data this paper models coastal vulnerability (CoVI) of United Sates coastal counties over a four decade period. CoVI spatially and temporally tracks how coastal vulnerability has changed between the years of 1960, 1970, 1980, and 1990. Additionally, this study looks at the relationship between CoVI and biophysically based coastal vulnerability indices to draw correlations between the two.

Our analysis began with over 200 socio-economic variables from the United States census on the county level for 1960, 1970, 1980, and 1990. These variables were reduced to 42, which were used in a principle component analysis to reduce the data further resulting in 9 to 11 factors. These factors were then combined in an additive model to produce a metric for each county, which denotes its relative vulnerability. Preliminary results of our analysis indicate that we can explain between 76 and 81 percent of the variance in our model as well as describe how socio-economic vulnerability has changed over time along the coastlines of the United States.

Additionally, we have statistically correlated the results of CoVI with several other coastal vulnerability indices in order to examine

the relationship between socio-economic and biophysical vulnerability. Our results suggest a relationship between those areas that indicate a high level of socio-economic and biophysical vulnerability. This analysis indicates that it is important to include both biophysical and socio-economic vulnerability in order to examine a regions overall vulnerability.

Date that model application was completed: November 20, 2002

Case study geographical location: Coastal counties of the United States

Vulnerability assessment indicators:
age, income, healthcare facilities, education, ethnicity, occupation, gender, urban/rural, housing, commerce, development

Methodology data requirements:
1. United States census data for 1960, 1970, 1980, and 1990 on the county level.
2. United States Geological Survey's (USGS) coastal vulnerability index (CVI).
3. GAP analysis and state Heritage Program Rankings.
4. Maximum wind exceedence probabilities for a category 1 hurricane (Jagger, et al., 2001).
5. Coastal Vulnerability Index (CVI) (Gornitz, et al. 1991).

Direct participants in the application of the model of the vulnerability:
Non Governmental Organization
Research/Training Institute

Economic and social sector participants directly involved: --

Methodology objective:
Examine historical change in the socio-economic vulnerability of United States coastal counties and compare the results to current biophysical vulnerability indices at the same scale.

Methodology output:
1. Socio-economic Vulnerability Index (CoVI) for United States Coastal counties for the years 1960, 1970, 1980 and 1990.
2. Correlation between CoVI and other biophysically based coastal vulnerability indices.

Results of methodology application at case study site:
1. Between 76 and 81% of our model variance was explained for each study period.
2. Increased understanding of historic shifts in socio-economic vulnerability in the United States
3. Increased understanding of the correlation between CoVI and other coastal vulnerability indices.

Lessons learned:
1. Those factors that have contributed to socio-economic vulnerability in the United States have changed over the time period of our study.

2. While spatial shifts in socio-economic vulnerability have been to the Southeast from 1960-1980, recent analysis indicates a homogenization of coastal populations.
3. A correlation exists between the socio-economic and biophysical vulnerability of United States coastal counties.